Patent Claims:

1. Apparatus for the determination of loads on fiber composite components (1), especially of vehicle and aircraft parts, whereby the components (1) is provided with a prescribable number of sensor elements (3) for the determination of strains, which are connected to an evaluating apparatus (4), characterized in that the sensor elements are embodied as strain gages (3) and are integrated into the fiber composite component (1).

2. Apparatus according to claim 1, characterized in that this is embodied as a testing or monitoring apparatus, whereby at least two or a plurality of strain gages (3) are integrated into the fiber composite components at prescribed spacing distances, whereby the strain gages detect strains caused by material stresses at least on the damage relevant component surfaces and supply these as electrical signals to a central evaluating apparatus (4).

3. Apparatus according to claim 1 or 2, characterized in that the integration of the strain gages (3) is achieved by laying-in the flat foil strain gages (3) between various different fiber layers (2) of the composite fiber material.

4. Apparatus according to claim 3, characterized in that the integration of the strain gages (3) is carried out

approximately in the middle of the fiber layers (2) in the area of the neutral fiber of the fiber composite material.

5. Apparatus according to one of the preceding claims, characterized in that the measuring grids (5) of the strain gages (3) are covered on both sides with insulating layers (6, 7) of a carrier material, and whereby the connecting points of the measuring grid (5) are electrically connected with connecting pins (8) oriented perpendicularly to the measuring grid (5) and protrude outwardly in an insulated manner out of one of the fiber cover layers (2) of the fiber composite component.

6. Apparatus according to one of the preceding claims, characterized in that each connecting pin (8) is connected above the fiber composite material with a fixed contact post (21), which lies in contact on the upper fiber layer (2) in an insulating manner, and serves for the releasable connection with the evaluating apparatus (4).

7. Apparatus according to one of the preceding claims, characterized in that the evaluating apparatus (4) is embodied as an electronic computing apparatus, which forms location-allocated strain values from the electrical signals of the various different strain gages (3), whereby the strain values are proportional to the local component loading.

8. Apparatus according to claim 7, characterized in that the evaluating apparatus (4) is embodied as a load monitoring apparatus which forms location-allocated strain values from the electrical signals of the various different strain gages (3), whereby the strain values are proportional to the local component loading and are stored by the evaluating apparatus (4).

9. Apparatus according to one of the preceding claims 1 to 7, characterized in that the evaluating apparatus (4) is embodied as a monitoring apparatus, which compares the location-dependent strain values with construction-necessitated load limit values, and displays or signals a damage danger or a damage upon exceeding of one or more limit values.

10. Apparatus according to one of the preceding claims 1 to 7, characterized in that the evaluating apparatus (4) is embodied as a testing apparatus, which couples the applied component loadings with location-allocated strain values, and from that forms a loading or tension analysis of the tested fiber composite component.

11. Method for the production of an apparatus according to one of the claims 1 to 10, characterized in that at least one or more fiber layers (2) are laid into a prescribed mold (15) and are provided with a polymeric material, and following that, several flat foil strain gages (3) with

measuring grids (5), and connecting pins (8) oriented perpendicularly thereon, are placed on the one or more fiber layers at provided component locations, which foil strain gages and contact pins are covered with at least one further layer (2), out of which the connecting pins (8) protrude outwardly above the fiber cover layer (2) and are pressed to form a solid or rigid fiber composite component (1) with integrated strain gages (3).

12. Method according to claim 11, characterized in that the fiber composite component (1) is produced by means of vacuum or pressure process, whereby a post or stamping die (21) of soft porous material is arranged above a peel-off film (16), which post or stamping die receives the outwardly protruding connecting pins (8), and which is again removed after the production process.

13. Sensor element for the determination of strains in fiber composite components (1), which is embodied as a strain gage (3) and consists of a conventional measuring grid (5) with a carrier layer (6) and an upper cover layer (7), characterized in that connecting pins (8) arranged perpendicularly to the measuring grid (5) are provided as electrical connection points, and that the upper cover layer (7) of the foil strain gage (3) is embodied like the carrier layer (6) thereof.

14. Sensor element according to claim 13, characterized in that a strain relief (10) of the measuring grid material is provided between the end points of the measuring grid (5) and the connecting pins (8), wherein the strain relief prevents a measured value falsifying resistance influence of the supply lines in connection with large material strains in the fiber composite material.

15. Sensor element according to claim 13 or 14, characterized in that the outer surfaces of the carrier layer (6) and of the cover layer (7) are irradiated for roughening, and thereby serve for the improvement of the adhesion forces to the fiber layers (2).

16. Sensor element according to one of the claims 13 to 15, characterized in that the strain gages (3) are embodied as longitudinally oriented measuring grids (5) or as rosettes.

17. Sensor element according to one of the claims 13 to 16, characterized in that the connecting pins (8) are surrounded by an insulating layer (20), which is easily removable for the coupling to an evaluating apparatus (4), and whereby the connecting pins (8) comprise a length of 5 to 50 mm and possess an approximately 0.5 to 2 mm diameter.

18. Apparatus according to one of the claims 7 to 10, characterized in that the evaluating apparatus (4) is equipped with a processor (23), which evaluates the electrical signals of the strain gages (3) with respect to various different criteria, such as probability or prevalence distribution, polarity and time sequence.

19. Apparatus according to one of the claims 7 to 10 and 18, characterized in that the evaluating apparatus (4) consists of an electrically shielded housing (24), an electrical current supply (25), an amplifier unit (26), a processor (22), an internal timer (23) and a data memory apparatus (27).

20. Apparatus according to one of the claims 7 to 10 as well as 18 and 19, characterized in that the contact pins (8) are used at each measuring location for the securing of an electrical apparatus for the measuring location identification (28) and are circuit-connected before the evaluating apparatus (4).